

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

V. N. Karazin Kharkiv National University



ECOLOGY IS A PRIORITY

**Materials of the student's
scientific conference**

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MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
V. N. KARAZIN KHARKIV NATIONAL UNIVERSITY

Ecology is a priority

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The publications contain the proceedings which address the modern ecological state of environment and ecological problems in different regions of Ukraine and other countries and also ways of their solution.

Публікації містять результати робіт, що стосуються сучасного екологічного стану навколошнього середовища та екологічних проблем у різних регіонах України та інших країнах, а також шляхи їх вирішення.

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RESEARCH THESES

Dobronos P. A., Student

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RECREATIONAL LOAD ON OAK FOREST PARK IN KHARKIV

Among the complex of negative factors, the recreational load plays an essential role in the anthropogenic transformation of the forests in the green zone of Kharkiv, represented mainly by oak and pine forests.

Therefore, the purpose of this paper is to study anthropogenic transformation in conditions of recreational influence of oak plantations in the Forest Park.

The objectives of the study are:

- to analyze literary sources on this subject and previous scientific researches;
- to conduct field research on trial areas with different stages of recreational degression;
- to develop recommendations based on the research results.

The field experiment was conducted on the territory of the Forest Park, where trees were studied on the test sites, the stage of recreational degression was determined as well as soils. The exact «binding» of the studied areas is made using GPS – navigator. Soil samples were taken to a depth of 0-30 cm from five points, mixed, in accordance with the requirements for sampling soil. Analytical experiments were carried out in the laboratory of V.N. Karazin Kharkiv National University.

Recreational load is the degree of the after-effects of holidaymakers on natural components, expressed in terms of human or human-days per unit area for a period of time.

On the territory of the Forest Park we have identified areas with different stages of the digression and conducted their research. Let's consider separately each stage.

In the area of the first stage of the digression, the grass cover and litter is non-sacrificial and corresponds to the type of forest. Underbrushes and growth corresponds to the forest conditions and are not damaged.

In the area of the second stage of the digression, the grass cover was not damaged. The severity of the cover is expressed by the undergrowth which is satisfactory and good. The drivers in the control area are in good and satisfactory state.

On the site of the third stage of digression the grass cover is impure. The layers of the cover are still intact. The growth is slightly differentiated. There are no indigenous forest species of young growth.

On the section of the fourth stage of the digression, the grass cover is degrading. The bedding is in the stage of destruction.

On the section of the fifth stage of the digression the grass cover, growth and undergrowth is almost completely absent.

Comparing sites of different degrees of diffraction by soil characteristics allows us to classify the soils of all sites in the category of slightly alkaline

The content of carbonates and chloride ions in areas of varying degrees of diffraction suggests a decrease in bufferness of the soil with anthropogenic load growth. This leads to deterioration of the conditions for the growth of trees.

Recommendations

- The number of tourists at different sites of the Forest Park should correspond to their recreational capacity to preserve ecological balance.
- In order to reduce the spontaneous recreation that causes diversion, it is necessary to arrange recreational items that will ensure reduction:
 - the risk of fire;
 - contamination of the forest park area;
 - squatting area of vegetation;
 - the possibility of getting lost in the recreation area;
 - the risk of entering a recreation area in the protection zone of the Forest Park;
 - risk to encounter wild animals (wild boars, snakes);
 - risk to damage unique and rare plants.

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**INSTALLATION OF METROLOGICAL CHARACTERISTICS OF THE
BIOTECHNOLOGY METHOD FOR DETERMINATION OF ACUTE
LETTAL TOXICITY OF WATER ON ECONOMIC DEVELOPMENT
CERIODAPHNIA AFFINIS LILLJEBORG**

The Water Code of Ukraine (WCU), in particular, Article 34 «Standardization in the field of water use and protection and reproduction of water resources» to the complex of standardization documents, along with other objects, includes methods, techniques and means for determining the composition and properties of water, as well as metrological norms and rules.

According to Article 10 of the Law of Ukraine dated June 15, 2004 No. 1765-IV «About Metrology and Metrological Activity», the results of any types of measurements can only be used, provided that the relevant characteristics of the measurement errors are known, in connection with which methods of performing the measurements must be certified.

The use of bioanalysis to assess environmental pollution, in particular for aquatic ecosystems, has become relevant and has become widespread in recent decades. The standardization of the conditions of the biotesting should be better defined to ensure applicability as an effective analytical tool. The article [1] considers the current international situation and the specifics of the practice of cultivating and using test organisms for bioanalysis. Standardization of bioproducts requires the use of appropriate sources of test cultures and the provision of appropriate crop conditions. The article deals with recommendations on the choice of types of tests and their cultivation in the context of established ecotoxicological goals and assessment of the sensitivity to various toxic substances. The quality of water used

for test cultures is highlighted. The requirements for water quality and the possibility of using synthetic environments have been analyzed. In the research [2], the reproducibility of the toxicity test was determined using 12 reference toxicants. The variability coefficient EK_{50} varied from 6.95% to 55.37%, and the variability was comparable to that observed for *D. magna* and other models for testing aqueous media. The study showed the need to include crustaceans in the battery of biotests to detect the presence of hazardous chemicals in soils, sewage sludge, bottom sediments and water systems. For the method of biotesting to determine the acute lethal toxicity of water on crustacean *Ceriodaphnia affinis Lilljeborg* (hereinafter referred to as *Ceriodaphnia*) is based on establishing the difference between the number of deaths in the analyzed water – experiment, and the amount of water in it that does not contain toxic substances - control. The criterion for acute lethal toxicity is the death of 50% *Ceriodaphnia* and more in the experiment compared with the control for 48 hours of biotesting.

When establishing metrological characteristics of the technique of biotesting to determine the acute lethal toxicity of water on crustacean, we used the procedure that is given in the normative documents [3, 4].

As a result of experiments conducted for the method of biotesting to determine the acute lethal toxicity of water on crustacean *Ceriodaphnia*, the following metrological characteristics were established:

- the biotesting result error is 0.65 mg/dm^3 (61%);
- reproducibility of biotesting results is 0.33 mg/dm^3 (31%);
- the standard of operational control of the reproducibility of biotesting results is 0.91 mg/dm^3 ;
- the reaction range of *Ceriodaphnia* is $0.9\text{--}3.3 \text{ mg/dm}^3$.

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COMPARATIVE CHARACTERISTICS OF THE MAIN SIGNS OF CHEMICAL AND BIOLOGICAL METHODS

The analysis of the data of the conducted ecological monitoring consists of several successive stages. Each of their stages ends with obtaining an independent ecological result. The passage of the whole path from the first stage to the last allows to fully establish a strategy of prospective use of the studied ecosystem, to rationally plan anthropogenic loads in order to prevent damage to biota.

Environmental hazard, or risk, should be assessed taking into account not only the nature and force of anthropogenic impact, but also the biological properties of the reacting system.

Accordingly, there are two groups of methods for environmental monitoring: physic-Chemical and Biological (biomonitoring).

Biomonitoring, or tracking the reaction of living organisms to environmental pollution, identifies changes in habitat through bio objects and is now seen as a type of environmental monitoring [1].

An integrated assessment of the quality of the environment is proposed to determine the status of Bioresources, develop a strategy for rational use of the region, determine the maximum permissible loads for the region's ecosystems, create recreational and Protected areas.

Each of the types of monitoring has its limitations. For qualitative estimation and prognosis of a condition of a natural environment it is necessary their combination.

Thus, physical-chemical and biological monitoring do not exclude, but complement each other.

The first stage is the environmental assessment of the natural object based on the study of the nature of the response of living organisms to anthropogenic factors using bioindication and biotesting methods [2].

The next stage is ecological diagnostics, consisting in revealing and ranking of factors of inanimate nature which can cause ecological trouble of a natural object.

Next is the stage of ecological rationing, i.e. (that is to say) calculating the boundaries of values of factors, the output beyond which transforms the state of the ecosystem from prosperous to dysfunctional.

Management decisions are applied not only after the prediction of the state of the ecosystem, but also at the stage of rationing, when it is possible to reduce the values of hazardous impacts to ecologically acceptable levels when exposed to the ecosystem.

Chemical methods of determination of concentrations of pollutants in water allow to establish the fact of presence of any substance in water and to check conformity to their established standards of water quality. However, they have a number of drawbacks. With their help it is impossible to get information about biological effects of individual substances, and, what is especially important, their joint action. Data obtained as a result of chemical analysis are expensive. In addition, the number of chemical compounds and their metabolites polluting the natural environment is so large that it is difficult to control. Currently only about 0.3% of known chemical substances are controlled.

Comprehensive approach to biological monitoring (combination of bioindication and biotesting methods, use of objects of different levels of organization) with systematic observation allows to judge the prospects of the structure change Communities, population productivity and ecosystem resilience in relation to anthropogenic factors.

The methods of bioindication suggest the identification of the types of indicators of saprobes in reservoirs during the field studies and are intended for

Table. Comparative characteristics of the main signs of methods

Indicator	Chemical methods	Biological methods	
		Bioindication Response indication	Biotesting Exposure Indication
Research Object	Water	Water	Water
Goal	Definition Concentration Chemical Substances	Biota, biocenosis Defining metrics	Aquatic Community
Water quality indicator, toxicity	Exceeding established regulations Concentrations	1. Change in number and species composition, Structural-functional state of the cenoses, the presence of species-Indicators 2. Absence of organisms, loss of species, taxa (anti-indication) 3. Presence of dead organisms	Total Score Toxicity using Representative Test objects of different trophic levels and systematic Accessories
Regulations	Macs	Comparison with a background (conditional clean) plot	Presence of toxic action on test objects (on the organism, population, species, ecosystem levels)
Guarantee of information quality	Strict adherence to the methods of selection, analysis Chemical samples, use of modern instrument base	Strict adherence to methods of selection, processing of biota samples, qualification high Specialists	1. Lack of Acute and chronic toxic effects 2. Mandatory Comparison with control (presence of two controls)

estimation of surface water quality. Biotesting-A more new direction, based on the reaction of biological test-objects (organisms, populations, ecosystems), used to assess the level of toxicity of natural, wastewater and new compounds synthesized for the national economy [3].

Biological methods of quality control of the environment do not require preliminary identification of specific chemical compounds or physical effects, they are quite simple in execution, many express, cheap and allow to conduct quality

control of the environment in Continuous mode. However, analytical methods should be applied once the total toxicity of soil or water samples has been identified to determine its causes. Traditional physic-chemical methods also allow to assess the contribution of individual enterprises or other sources of pollution to the integrated technogenic impact on nature.

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FORECASTING NATURAL SYSTEMS DEVELOPMENT IN THE OCEANIC CLIMATE (CASE NATURE RESERVE LAND DE GASCONY IN FRANCE)

Nowadays, it is important for the protection of the environment to simulate the development of the situation in the study area. In this way, we can identify risks or positive trends for the study area, the development of its components and ecosystems at all. In this project, modeling using one of these programs was carried out for a forest area on the territory of the Land de Gascony Nature Reserve.

Objective: To create a model of development for a forest area on the territory of the Land de Gascony Nature Reserve.

Object: Program for territories development modeling. Land de Gascony National Reserve.

KEY WORDS: MODEL, NATIONAL RESERVE, DEVELOPMENT.

In this area, most of the tree plantations were planted artificially. Forests in France have a special conservation status and are in the exclusive ownership of the state. The territory is part of the Land de Gascony Nature Reserve.

The main species growing on the territory of Land de Gascony Nature Reserve are: oak, elm, linden, chestnut, alder, laurel, strawberry tree, plum, apple, cherry and others. The territory refers to the habitat of a wild forest cat, fox, badger, ermine, red deer, roe deer, fallow deer, wild boar, squirrel and hare.

Using LPJ-GUESS Education 3.0 was built model of vegetation development in Cohort. After simulation of the territory development for 500 years, we obtained model with such results.

The biomass of the main dominant type of vegetation - Temperate broad leaved evergreen tree increases throughout the entire simulation period. We can also see that

the carbon content in the soil stabilizes at a rate of 20–22 kg / m² after a sharp jump simultaneously with a decrease in the biomass of the main species of vegetation, which is certainly interrelated.

Based on this research, such conclusions were made:

1. The dominant type of vegetation, temperate broad leaved evergreen tree, in this area will be firmly entrenched and there will be a significant increase in its biomass.

2. An increase in the biomass of the main species will lead to an improvement in the conditions for the conservation of biodiversity, an increase in the population of typical species.

3. Since the territory is included into the reserve zone of the nature reserve Land de Gascony, it can be argued that with the increase in the biomass of vegetation and the improvement of conditions for biodiversity conservation, the ecological importance of the reserve in the network of protected areas of the region will increase.

4. As a result of these points, it can be argued that the cultural value and recreational opportunities of the region will increase.

So, as we can see, the program for modeling the development of the territory provides sufficiently detailed information for the chosen territory. It should be noted that not all parameters provided by the program as a result of the simulation are presented in the work, are basic. This program can be used for various territories of our planet for the organization of environmental management systems.

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CREATING AN ECOLOGICAL NETWORK ON THE COAST OF THE AZOV SEA (BASED ON THE OBJECTS OF THE EMERALD NETWORK)

There are a lot of different nature objects which need our protection. Emerald Network is the wonderful EU project, the aim of which is to show people huge diversity of nature territories on our planet. Emerald Network list includes Ukraine territory, too.

The main goal of this work is making project of Ecological Network on the Azov Sea coastline, based on the Emerald Network territories as on the cores.

Objective: To determine the area most suitable for creating an ecological network on the coast of the Azov Sea. Create an ecological network model for the selected territory.

Object: Coast of the Azov Sea. Objects of the Emerald Network on the coast of the Azov Sea.

The Azov Sea coastline is characterized by the fact that there are seven large areas of the Emerald Network and several small ones. These include: Bilosaray Sand bar, Middle Sand bar, Obitnycha Sand bar, Molochny Liman and Azov-Sivash National Park, which occupies a separate bar and some coastal areas covered by estuaries.

Berdiansk Sand bar has high salinity lakes as a characteristic feature. The salinity of water in them varies from 4-6 ‰ in Sweet Liman to 130 ‰ in the Long (almost as in the Dead Sea). The current ecological situation on the sand bar is very acute, because it is almost completely built up - mainly by the resort and recreational facilities. On the Berdiansk spit there are 70 health establishments. The plants on this territory are protected by the Ramsar covension.

Obitnycha Sand bar is characterized by dune relief and nesting place for numerous waterfowl, mass spawning of sea fish (along the coast). On the territory of the spit there is a reserve of national importance – Obitnycha Kosa.

Next large object is the Milk estuary. Since 2010, it has become part of the Pryazovsk National Natural Park. In 1995, the estuary was included in the list of wetlands of international importance that fall under the Ramsar Convention.

The Molochny Liman is a nesting site for many species of birds and a breeding ground for valuable species of marine fish (primarily for the Black Sea and Azov pelengas). In addition, there are 14 species of rare plants and animals listed in the Red Book of Ukraine.

And the last object is the Azov-Sivash National Natural Park, created on February 25, 1993. The region is characterized by prolonged droughts with dry winds. The vegetation of the Sivash Islands is represented by desert steppe and saline grasses. Total registered 308 species of plants, including 12 species of animals, are listed in the Red Book of Ukraine.

Thus, this region has both a natural and recreational value for people.

The territory is one of the large industrial seaside regions of Ukraine. There is a lot of machine-building industry which influences on the environment. As we know, a lot of different kinds of relict and rare plants, specific landscapes are there. The main part of them live on the sand bars so they will go under the water in a few decades.

That's why we should protect the Azov Sea coastline. Creating an ecological network will open new possibilities for people here and attract tourists and investors here.

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AGRO-ECOLOGICAL ASSESSMENT OF SURFACES FOR ORGANIC LANDSCAPING

The publication presents the results of studies on the suitability of soils for private plots for organic farming on the example of a private estate in Novopokrovka village in Chuguv district of Kharkiv region. According to the results of the research, it was found that the plots are suitable for organic farming.

Key words: heavy metals, trace elements, organic farming, MAC.

The research was conducted in 2018 on a representative site with an area of 30 m², which was laid on the territory of the private estate of the village Novopokrovka Chuguv district of Kharkiv region. Soil samples were taken from a layer of soil 0 - 20 cm in accordance with DSTU 4287: 2004 [1].

The peculiarity of the study area is the long-term monoculture of cucumbers, for which organic fertilizers were applied during the whole time, once every three years under the basic cultivation of soil.

The chemical analysis of the soil was carried out in the laboratory of instrumental research methods of the NSC "A. M. Sokolovsky Institute of Soil Science and Agrochemistry". In the soil samples, the mobile forms of HM (Cd, Cu, Fe, Pb, Zn) in the buffer ammonioacetate extract (pH 4.8) were determined by the atomic absorption spectrophotometry method [2]. The results of the study of the heavy metals content in the soil are presented in Table.

According to GOST 17.4.3.06-86, the ecological state of soils as to the degree of pollution of the HM is assessed at the maximum permissible concentration (MPC) and background content of metals in the soil [3]. From the results of the study it can be seen that none of the elements exceeds the MPC of the moving forms of HM in the

soil. The coefficients of the HM concentrations for the soil layer 0-20 cm were calculated using the background values for the soils of Kharkiv region [3]. The total contamination index Z_c [4] is 28.38. This is a level of moderate danger of contamination, land can be used for any crops under the condition of quality control of plant products [4].

Table. The content of heavy metals in the soil under the monoculture of cucumbers in 2018, mg / kg.

Elements	Content	Maximum permissible concentration [3]	Background content [3]	K_c [4]
Fe	4,65	-	3,22	1,44
Zn	10,835	23	0,38	28,5
Cu	1,225	3	0,36	3,04
Cd	0,005	0,7	0,15	0,03
Pb	3,13	6	0,62	5,04

With the help of the methodology for soil fertility assessment for organic farming [5], we define the soil suitability class for organic farming in terms of heavy metals content. The results indicate that the soil content of zinc, copper, and lead corresponds to a suitable level for organic farming.

Indicators characterizing the quantitative content of heavy metals make it possible to determine not only the level of pollution by heavy metals, but also the lack of trace elements in the soil. That is, the assessment of the chemical composition of soils is an indicator of pollution or insufficient content of trace elements [3].

An analysis of the level of soil cover of the experimental site with the moving forms of physiologically necessary trace elements [6] showed that the content of zinc and copper is at a high level, which is a positive factor for organic farming.

That is, as a result of the conducted research it was discovered that a private estate in Novopokrynsk village of Chugiv district of Kharkiv region is suitable for organic farming: there is an organic fertilizer system, the level of soil pollution is moderately dangerous. It is possible to use a land plot for any crops under the

condition of quality control of vegetable products, according to the content of heavy metals, the soil corresponds to a suitable level for organic farming, there is a sufficient amount of moving forms of zinc and copper in soil.

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ABSTRACT THESES

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ZERO WASTE

Zero waste is a global movement to prevent garbage from appearing in our homes. The founder of the movement is the French eco-activist Bay Johnson, who took the initiative to inspire people for a clean future.

Every day, there is a study of the changes in the environment. According to the Science Advance magazine, 91 percent of the world's plastic was not recycled and about 79 percent landed on landfills or other parts of the environment. If these rates of disposal and consumption continue, by 2050 about 12 thousand metric tons of plastic waste will be filled with dumps, according to researchers.

There are 5 basic principles of zero waste:

Say «no»

This principle is based on the rejection of unnecessary things that fall into our homes and the use of alternatives. Many alternatives reduce the negative impact on the environment and inspire people to improve the world.

Reducing consumption

A person can determine how much and what she really needs in life. This principle encourages us to refuse unnecessary things.

Use again

There are things in our lives that you can give a second life that is to use them for another purpose, instead of sending to the garbage.

Sort and dispose of it

All things require sorting and recycling, but it is more of a contribution to reducing the amount of garbage accumulated and purchased.

Compost

Composting is a method of producing fertilizers from various organic wastes, to produce environmentally friendly products and improve soil.

The waste hierarchy

The main principles of the hierarchy are reducing the amount of waste generated in the course of our actions and highlights the value of re-purposing and recycling the waste produced.

1. Reduce (The need to prevent waste in the first instance)
2. Reuse (Give a second life to things before they become waste)
3. Recycle (Turning waste into a new product)
4. Recovery (Recover energy from the waste materials)
5. Disposal (landfill, standard incineration and gasification.)

What are the conditions in Ukraine today to switch to Zero Waste?

Ukraine has all the conditions for the introduction of Zero Waste. Certain movement already exists, but not so global, which would be desirable, but the beginning is. There are people who are struggling to preserve the rare species of plants, animals, protected areas, created shops that produce alternative products, there are organizations sorting, recycling waste. The only part of society's problem is neglect, some indifference to the environment, but the movement in Ukraine is growing, and more and more people are being attracted to it, inspired by the best changes of others. It's our planet and we have to protect it. .

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HARMFUL EFFECTS OF ROAD TRANSPORT

The transport and road complex is one of the most powerful sources of environmental pollution. In addition, transport is the main source of noise in cities, as well as the source of thermal pollution. Gases released by combustion of fuel in internal combustion engines contain more than 200 names of harmful substances, including carcinogens.

In our time, motor transport is the main source of air pollution in large cities. Hazardous substances, during the operation of vehicles, fall into the air with exhaust gases, vapors from fuel systems, as well as during refueling the car with fuel. Spilled gases accumulate in the lower atmosphere, that is harmful substances are in the human respiratory zone. In addition, transport is one of the main causes of the greenhouse effect caused by carbon dioxide (CO₂) emissions due to fuel combustion.

Therefore, in order to reduce the harmful effects of transport on man and the environment, the following basic measures should be taken: the use of new types of power equipment in which the emission of harmful substances is small.

This direction includes the development of automobile engines with gas turbine, adiabatic diesel engines, Stirling engines, electric power units and the use of low-emission engines as well as the replacement of car manufacturing technologies to reduce the toxicity of exhaust gases and many other measures.

So, to overcome the problem of harmful effects of vehicles on human health and the environment it is necessary to carry out a system of measures, but the most priority of them is transition to electric vehicles and solar-powered cars that will be safe. In future we will use alternative energy sources because only their introduction can stop the total pollution of the planet.

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THE GREAT PACIFIC GARBAGE SPOT

The Great Pacific Garbage Spot is quite interesting for exploring research and, at the same time, an undetermined danger for all of mankind.

The garbage spill in the Pacific is the largest and most famous in the world of floating garbage accumulation, located between the Hawaiian islands and California.

The exact area of the spot is still not established, its estimates estimate ranges from 700 thousand to 1.5 million km² or more, which turns from 0.41% to 0.81% of the total area of the Pacific Ocean.

The actual accumulation of garbage was discovered in 1997 by Charles Moore, a yachtman who sailed through a mix of different floating garbage on his way home to Los Angeles.

The study found that among the garbage, fishing nets make up as much as 46%, and from the rest most garbage is made up of fishing ropes, traps for oysters and acne, various boxes and baskets.

If at the end of XX century the amount of garbage in water was an average of 400 g / km, then by 2015 the figure has increased to 1230 g / km. Large particles of rubbish account for 92% of the total mass ("large" are fragments of more than 5 cm in size).

The damage done by the waste spill to the environment is very high. According to researchers, about 100,000 marine animals are suffocated and injured annually in fishing nets.

Do not forget that the suspension of small plastic particles resembles zooplankton, and sea animals and birds can take it for food. As a result, a large amount of durable plastic is found in the stomachs of animals.

Thus, mankind once again created a problem.

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FARMING UNDERGROUND IN A FIGHT AGAINST CLIMATE CHANGE

The Andean Plateau or the Altiplano is one of the largest and highest plateaus in the world. In order to protect their crops from drought, flash floods and increasing temperatures, Bolivian farmers are going underground.

Bolivia is among the nations least responsible for climate change, but one of the most vulnerable to its effects.

Almost 60% of Bolivian farmers live on the Altiplano, but it is a place of extremes, suffering from draught, frost , radiation.

Following traditional farming methods, such as growing on terraced field or using foot ploughs, makes crops vulnerable to erratic rains and erosion.

In an effort to ensure food security for their families and livestock, some Bolivian farmers have built underground greenhouses, locally known as «Walpinis».

With only their roofs visible, they are barely indistinguishable from the plateau's arid landscape.

What is inside:

1. Bricks absorb and conduct heat from the sun, creating warm and humid conditions all year round.
2. Walpinis are built to defend crops from the elements: including hail storms, flash floods and burning heat.

Farmer and llama breeder, Gabriel Cond Apaza built his Walpini two years ago. Cheap and simple, he tells it's helped him to save money and improve the diet of his five children.

«We no longer buy vegetables in the market» says Condo.

He says that farming out in the open has become nearly impossible, due to increasing temperatures and erratic rainfall.

Local name Walpini translates as “very well”, because irrespective of the conditions outside, the Walpini maintains a stable microclimate inside.

However, this is not some ancient Andean agricultural practice, but a technology developed just 25 years ago by a Swiss volunteer, Peter Iselli.

Founded by a European development fund, Peter’s mission was to explore new technologies that could ensure food security for this rural population. Used materials from BBC

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OCEAN ACIDIFICATION

For millions of years, Earth's oceans have maintained a relatively stable acidity level. It's within this steady environment that the rich and varied web of life in today's seas has arisen and flourished. But research shows that this ancient balance is being undone by a recent and rapid drop in surface pH that could have devastating global consequences. Since the beginning of the industrial revolution in the early 1800s, fossil fuel-powered machines have driven an unprecedented burst of human industry and advancement. The unfortunate consequence, however, has been the emission of billions of tons of carbon dioxide (CO₂) and other greenhouse gases into Earth's atmosphere. Scientists now know that about half of this anthropogenic, or man-made, CO₂ has been absorbed over time by the oceans. This has benefited us by slowing the climate change these emissions would have instigated if they had remained in the air. But relatively new research is finding that the introduction of massive amounts of CO₂ into the seas is altering water chemistry and affecting the life cycles of many marine organisms, particularly those at the lower end of the food chain.

When carbon dioxide dissolves in this ocean, carbonic acid is formed. This leads to higher acidity, mainly near the surface, which has been proven to inhibit shell growth in marine animals and is suspected as a cause of reproductive disorders in some fish. On the pH scale, which runs from 0 to 14, solutions with low numbers are considered acidic and those with higher numbers are basic. Seven is neutral. Over the past 300 million years, ocean pH has been slightly basic, averaging about 8.2. Today, it is around 8.1, a drop of 0.1 pH units, representing a 25-percent increase in acidity over the past two centuries.

The oceans currently absorb about a third of human-created CO₂ emissions, roughly 22 million tons a day. Projections based on these numbers show that by the end of this century, continued emissions could reduce ocean pH by another 0.5 units. Shell-forming animals including corals, oysters, shrimp, lobster, many planktonic organisms, and even some fish species could be gravely affected. Equally worrisome is the fact that as the oceans continue to absorb more CO₂, their capacity as a carbon storehouse could diminish. That means more of the carbon dioxide we emit will remain in the atmosphere, further aggravating global climate change. Scientific awareness of ocean acidification is relatively recent, and researchers are just beginning to study its effects on marine ecosystems. But all signs indicate that unless humans are able to control and eventually eliminate our fossil fuel emissions, ocean organisms will find themselves under increasing pressure to adapt to their habitat's changing chemistry or perish.

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WASTE RECYCLING IN KHARKIV

Today there are many environmental problems that worry us, young people, like no other. Littering is one of them. It can lead to water and air pollution, land and soil pollution and to many other unwanted effects. Litter has become a serious environmental issue nowadays. Of course, the majority of people know that littering is a negative thing. However, there are still lots of careless people who continue scattering their trash around. People buy more and more unnecessary things every day, instead of reviving their old things. For example, instead of buying a new pair of shorts, we can simply shorten our old jeans. People forget that plastic is highly harmful for the environment.

Stepping back from personal litter, factories and their owners should be more environment-oriented as well. Every year millions of chemicals are thrown into water and air. The harm from littering can be prevented only by overcoming human ignorance. When people start reducing their litter, reusing and recycling their everyday items, our planet will become a better place to live.

That is why I would like to tell you about the promotions in which I participate and which help to prevent this environmental problem.

On September 15, 2018, a major international event «World cleanup day» took place. This event is devoted to the problem of pollution. The aim of it is to make our planet green and clean. And the second action, headed by the Eco-Commission of the Kharkiv city youth council, is under the name of KHARKIV ECO CITY. The essence of this action is that people bring recycling materials (paper, glass, plastic), our commission transfers it to the processor and all the money goes to charity, that is, children with disabilities and women who have experienced violence. The action ended on March 10, 2018.

I would like to believe and hope that young people will become more environmentally conscious about this problem, understand the necessity of being active in protecting our own livelihood.

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THE EXTINCTION OF PLANT AND ANIMAL SPECIES

The extinction of plant and animal species is primarily the result of human activity. Population and economic growth, development together with little to no regards to environmental conservation have played a significant role in the continued extinction and the endangerment of plant and animal species. Human has destroyed a large number of wild animals throughout their lives. 17 animal species is extinct beginning from the 21st century. Endangered Species Act (ESA) has been able to save 227 species since 1973 year.

Western black rhinoceros was declared extinct in 2011 by the International Union for Conservation of Nature and Natural Resources (IUCN). Western black rhinoceros due to the belief that the rhino's horn had medicinal value people hunted then thus leading to their extinct.

Pinta island tortoise was considered extinct when the last known species named Lonesome George died on June 24th, 2012. The extinction of the Pinta island tortoise is believed to have been caused by goat immigration to the Island which brought about the detriment of tortoise's food and natural habitat.

Formosan clouded leopard was considered extinct in 2013. Formosan clouded leopard due to substantial logging activities to natural habitat the animals retired to the Tawu and Jade Mountains.

Due to the existence of the program «Extinct or alive» scientists were able to find Formosan clouded leopard. We need to be more concerned about the environment so that it would be comfortable to live not only for us but also to animals on Earth.

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AUGMENTED REALITY ON VERTICAL FARMS

Imagine a future where farmers wander through the rows of a greenhouse, wearing augmented reality glasses that tell them what type of tomato or peas they're looking at.

Huxley is a greenhouse system that uses complementary reality and artificial intelligence technologies. The founder of the company, Ryan Hux called his product "plant vision". Huxley has developed the world's first Augmented Operating System. And this is just the beginning.

A major problem for vertical farms is the search for a workforce that need to understand the soil acidity, humidity, climate and work for a small salary. Using the added reality will greatly simplify their work, which will no longer require specialized knowledge.

The system uses the color spectrum of the RGB, where infra-red is needed to detect early-stage disease, and ultraviolet radiation to track blooms and pollen.

Cameras installed above watch for signs of disease and pests, and monitor watering needs and growth rates. If the system spots an anomaly, it pings one of the augmented farmers to isolate the problem before it spreads.

The process of teaching machine vision in Huxley will help in the future create such robots that can take care of the greenhouse, harvest and treat illness.

The company works in Wageningen University, the Netherlands and develops tools for scientists. Huxley plans to collaborate with various universities and researchers to get information on the unique diseases of different plants and create a large database.

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ECOLOGICAL PROBLEMS AND METHODS OF REGENERATING MODERN FORESTS

As studies have shown, in the last 8 centuries more than half of forests that once covered our planet were erected under the fields, pastures or settlements. Among the remaining, only 22 percent consist of natural ecosystems, others are strongly altered by human influence. The best-preserved forests are boreal forests – a broad belt of coniferous trees between the Arctic tundra and deciduous forests of the warmer temperate zone. They remained intact due to harsh climate, long winters and degradation of soils (this hindered the development of agriculture).

The growth rate of production of the woodworking industry is 130.3%. The structure of using wood resources and wood production is generally unsatisfactory. Negative trends also occurred in the industrial processing of wood. Analysis of the material content of this sub-sector of the forest complex showed that 42% of the total volume of processed wood products was used, while the rest was processed for fuel and energy needs or went to waste.

Each cubic meter of waste used for the production of particleboards or wood fibreboards allows you to save about 2.2 cubic meters of business wood. Over the past 15 years, wood chipboards have saved 50 million cubic meters of high-quality wood, and 55 million cubic meters of wood fibers.

In order to regenerate the forests countries establish forest stands. And there are actually a lot of forest stands on the territory of Ukraine. The largest ones are the Gogol Forest, Volyn forest stand, Lipliyavsky forest stand and Razososhensky forest stand.

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VIDEOECOLOGY

The problem of videoecology has become particularly relevant in the last 50 years due to the general urbanization that has alienated man from the natural visual environment.

The term "videoecology" was introduced by Filin V.A. in 1989. It consists of two words: "video" –all that a person sees with the help of the organ of vision and "ecology" - the science of various aspects of human interaction with the environment.

The theoretical basis of videoecology is the concept of automatic saccades.

Saccades automatic is a property of the human ocular apparatus to perform rapid eye movements involuntarily in a certain rhythm in the waking state in the presence and absence of visual objects and during the paradoxical stage of sleep.

Homogeneous visual fields are visible fields in the surrounding space, on which either there are no visual details at all, or their number is sharply reduced.

Aggressive visual fields are fields consisting of many identical elements evenly distributed on a certain surface.

Recommendations for creating a comfortable visual environment

1. Avoid the appearance of aggressive visual fields in the urban environment,.
2. Prevent the appearance of homogeneous visual fields in the urban environment, as well as where you have to be for a long time.
3. Do not allow the appearance of large planes in architecture.
4. It should always be remembered that the "eye does not like" straight lines and right angles.
5. The silhouette of the building is one of the important components of the formation of a comfortable visual environment.

Comfortable visual environment has a beneficial effect on the condition of people, in particular, on their health, morals and business activity.

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FRESH WATER IN UKRAINE AND KHARKIV

The theme of my report was the problem of fresh water in Ukraine and Kharkiv.

As is known, the human body is seventy percent water, so it plays one of the most important roles in the life of the body. However, 80% of the population of Ukraine uses water from surface sources in their lives, and the ecological state of these waters is deteriorating every year. Insufficient sewage treatment, poor-quality treatment of industrial waters, excessive saturation with organic matter leads to the fact that today almost all the water bodies of the country are closer to the 3rd pollution class. But the treatment facilities that produce drinking water are designed to receive water of class 1-2 pollution. As a result, eighty percent of water samples show that its quality does not meet the conditions of state standards. Almost 75% of Ukrainians drink water from the Dnieper, the quality of which is deteriorating downstream. So the most difficult situation with the quality of drinking water in the Crimea today. If we talk about the cleanest water in Ukraine, then it can be used in the Poltava region, where almost all the water comes from underground sources.

For the first quarter of 2018, 1,259 water samples from sources of non-centralized water supply were investigated by sanitary and chemical indicators in Kharkiv and the region, of which 41.2% did not meet sanitary requirements for drinking water intended for human consumption

In the studied water samples, exceeding the normative indicators on the total hardness, the content of nitrates, ammonia, sulfates, chlorides, dry residue, iron were found.

The main problem is the excess of nitrates in water, noted in the laboratory. This is one of the main factors that adversely affects the health of the population, especially children.

Наукове видання

«Ecology is a priority»

Збірник тез доповідей

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